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A Dynamic Perspective on Second Language Acquisition

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Chapter 6 **General summary and discussion**

6.1 Summary

This PhD project is concerned with applying the principles of Dynamic Systems Theory in empirical research of L2 development. DST is an interdisciplinary descriptive framework of development in natural systems. Across such systems, it identifies simple and universal principles of growth and interaction, which lead to increasingly, and in essence infinitely, complex outcomes. In the last decades, DST has had profound implications for the study of human development, including that of language (van Gelder, 1999).

The dynamic approach considers language as an ensemble of interacting elements, which in turn interact with the environment on all levels. The environment, in this case, is comprised of the internal resources of language users and the external resources of their surroundings. Language, whether as a developing structure in individuals, or as a shared entity in communities, is not a closed and entropic system, and does not settle into stasis unless it has become extinct (Larsen-Freeman, 2006a; Spivey, 2007). Macro-level language change results from micro-level changes in the language systems of individual users. Within these systems, linguistic knowledge is similarly comprised of nested subsystems, which are in turn compounded of similar nested components. This nested hierarchy can also be seen in the processes involved – the process of language change and variation is comprised of myriad processes of individual language use and acquisition, which are in turn compounded from the co-development of knowledge aspects, and so forth towards minute detail at every level of language knowledge and time scale, from millennia to nanoseconds (Spivey, 2007). All of these developmental processes are simultaneous and ongoing. They reflect, on one hand, a codependency of developing elements within the structural hierarchy of language, in which certain structures are conditional for the development of higher, dependent structures. On the other hand, these processes also incorporate a seemingly-paradoxical competition for the limited external and internal resources available to the developing system.

This generic paradigm of interaction under the constraints of structural order and resource limitations is known as the precursor model. It is pertinent to an array of natural and developmental phenomena (Fischer, 1980; van Geert, 1991). When language is viewed from this perspective, intra-learner variability in performance and what Larsen-Freeman calls “indeterminacy in users’ intuitions” (2006a, p. 195) can be explained as meaningful expressions of shifts in precursor interactions, rather than as mere measurement error. In this view of variation, the dynamic approach diverges considerably from the predominant approach to applied linguistics, which focuses on linear and statistically-significant group effects.

There are numerous versions of the basic precursor model scheme, depending on the phenomena at hand. Many of these can be simulated by simple coupled logistic equations. In the domain of language development, such simulations have been applied to several aspects of L1 acquisition, among them the nonlinear and non-uniform growth of early lexicon and syntax (Robinson & Mervis, 1998; van Geert, 1991), and the sequential progression of early speech from single- to multiword utterances (Bassano & van Geert, 2007).

The studies in this thesis apply the empirical dynamic approach, which combines variability analyses and simulations based on the precursor model, to two areas of L2 development. The first area is vocabulary knowledge across a continuum of receptive-productive modalities; the second is text-level writing performance, reflected in the complexity and accuracy of the lexical and syntactic dimensions of writing. The studies have several features in common. First, both apply the dynamic perspective to combinations of two dichotomous paradigms in their respective areas of interest. In each study, the two sets of distinctions are merged into four-level continuums. In the vocabulary study, two paradigms of knowledge – word recognition vs. recall, and controlled production vs. free production – are collapsed into a single continuum of receptive-productive knowledge modalities. In the writing performance study, the distinction between writing complexity and accuracy and the distinction between the lexical and syntactic dimensions of writing are merged into a hierarchy of four categories: lexical complexity, lexical accuracy, syntactic complexity and syntactic accuracy. In each study, the sequencing of categories in the hierarchy was informed by previous findings as well as by common sense considerations.

The two studies utilize elaborate longitudinal data from four case studies of advanced ESL learning in immersion conditions. They inspect the central data growth

trends and the variability patterns around them, juxtaposing pairs of indexes, in order to reveal patterns that suggest complex precursor interactions. The studies then employ models of precursor interactions to simulate the data, based on van Geert's (1991, 1993, 1994, 2003) extensive work on mathematical descriptions of various precursor interactions. Each version "consists, first of all, of a specification of how the components involved in the system affect one another in terms of resource functions. (...) second, it specifies the initial conditions of each component, and third, the eventual conditional dependencies among the components" (van Geert, 2003, p. 664). This blueprint consists of a hierarchy of elements, across which there is a conditional threshold value for support from a component that emerges earlier, i.e., the precursor, towards its dependent, which in turn tends to compete with the precursor. To this blueprint, variations can be added, such as unidirectional or bidirectional competition or support from the dependent to the precursor, further conditional thresholds, developmental delays, and so forth.

In the two studies, the internal hierarchy of the precursor models, described by order parameters, was determined in accordance with the background literature on the respective area of SLA and findings from the preceding analyses. The interactions within this hierarchical order were then specified on the basis of the analyses outcomes. The studies distinguished two types of interactions in the data. The first is surface interactions, evident in correlations between the data components. The second is underlying or hidden interactions, revealed by variability around the central growth trends of the data and temporal shifts in the data correlations. This latter type of interaction was used to configure the relational control parameters of the model, which specify the interactions between its hierarchical levels. The two studies hypothesized that these underlying interactions, when iterated in the models, would yield growth trends and surface interactions that match those of the data. This hypothesis was in line with previous studies of L2 writing development, which have identified alternating variability patterns as manifesting complex or competitive interactions and associated these interactions with the precursor model, but have not verified their interpretations in simulations (Larsen-Freeman, 2006b; Spoelman & Verspoor, 2009, in press; Verspoor et al., 2008b).

In both studies, the hypothesis that the data variability is a meaningful manifestation of internal systemic dynamics was supported by two related outcomes

of the modeling procedure. First, when the relational control parameters of the models were optimized in order to obtain the best model fit to the data, their values matched the interpretations of the variability analyses results. Second, the optimized model outcomes fitted the data not only in terms of matching its growth trends, but also in terms of reproducing its correlation matrix, i.e., surface interactions. This was particularly evident in the main case study, a native Portuguese speaker, whose data provided the basis for the deduction of those interactions.

While the studies were not intended to compare the four participants, it is possible that the models would have achieved better fits to the three other case studies if similar detailed analyses of each dataset were conducted, informing the configuration of their respective model version. Due to time constraints, this could not be carried out as part of the current project. However, the fact that the general precursor hierarchy, as well as the overall interactions within it, could be extended from the main case study to the others quite successfully in both studies (with the exception of one participant, a Vietnamese speaker) is a strong statement in favor of the generalizability of the precursor model, at least to learners in similar circumstances and of a similar proficiency. The issue of generalizability is readdressed in the Discussion section of this chapter.

6.1.1 Differences between the vocabulary knowledge and writing performance models

So far, the models in the two studies were described as uniform constructs, according to the basic principles that informed them. However, there are certain differences between the two model versions. The vocabulary knowledge model configured only bottom-up interactions, from more-receptive to more-productive knowledge levels. Backward interaction, although assumed, was omitted from this model. This was done since the phenomena that it aimed to capture, the receptive-productive gap, is defined as a unidirectional lack of transfer from receptive to productive knowledge (e.g., Melka, 1997). Thus, although it is very likely that the interaction between receptive and productive vocabulary knowledge is more complex than feed-forward alone (cf., Clark, 1993), it was decided to simplify the model in order to test the applicability of its most basic premises to the issue at hand: the lack (or rather, nonlinearity) of transfer from lower to higher vocabulary knowledge levels.

Conversely, the performance categories included in the writing study – lexical complexity, lexical accuracy, syntactic complexity and syntactic accuracy – were not

as distinctively hierarchical as the vocabulary knowledge paradigm. The operational definitions of these categories involved indexes denoting pre-acquired skills, such as the ratios of subordination use or correct word order per clause. Moreover, these indexes, unlike the vocabulary knowledge levels, which are all related to the same set of words, were not necessarily associated with the same linguistic structures. Thus the model pertaining to this data incorporated feedback interactions (dependent to precursor) besides the basic feed-forward ones. This rendered the model more complex, and indeed achieved a better fit to the data (manifested in smaller sums of squared residuals) than the vocabulary knowledge model.

Another difference between the model versions was that the interactions in the vocabulary knowledge model were both by change and by level, while those in the writing performance model were by level only. This was in line with the idea that actively-acquired skills, as depicted in the vocabulary study, may exhibit simultaneous support and competition, which would be related to the current level of these skills and to the effort spent on their learning process, respectively. On the other hand, it was hypothesized that since the writing performance categories were pre-acquired (albeit not stable) forms of knowledge, their interactions would be directly related to their values rather than to a process of acquisition.

The differences between the model versions demonstrate that despite the apparent simplicity of dynamic modeling, it allows for the incorporation of numerous considerations, which should be theoretically and empirically motivated. Since both studies yielded a good model fit, as well as a confirmation of the interpretation of their preceding variability analyses as manifesting dynamic interactions, they can be considered fruitful. The topics which they addressed – vocabulary knowledge and complexity and accuracy in the lexical and syntactic dimensions of writing – have lent themselves fairly easily to dynamic modeling. This is because these areas have relatively straightforward and intuitively appealing orders (but see de Bot & Lowie, 2010; Elman, 1995, 2009), which are well-supported by previous findings and theory. Despite conceptual and operational disagreements between various studies of L2 vocabulary knowledge, there is a general agreement that receptive vocabulary knowledge precedes and is prerequisite for productive knowledge (but see Clark, 1993). Likewise, within writing performance, the precedence of complexity to accuracy and of lexicon to syntax is assumed by most researchers, with ample

supportive evidence (Anderson, 1993; Marchman & Bates, 1994), even while its causality is strongly debated. The two present studies thus illustrate how, in the dynamic approach, “descriptions and explanations of patterns of behavior derive from ‘robust and typical properties of the system’” (Kauffman, 1995, p. 19, as cited in Larsen-Freeman & Cameron, 2008, p. 26). Such properties are often widely documented in the relevant literature, in light of which the dynamic approach should be applied.

The studies in this dissertation have hopefully illustrated the potential contribution of DST to applied linguistics: its ability to reconcile disparate and apparently conflicting accounts while merging fragmented areas of language development and extending static theory to time-dependent development. The following section discusses this contribution and its limitations from a broader perspective.

6.2 Discussion

As the present studies have demonstrated, DST is a universal rather than domain-specific paradigm. Because of its generic nature, DST cannot be applied to any area without a relevant empirical and theoretical tradition. In applied linguistics, theories are predominately derived from cross-sectional studies that make use of linear analyses such as product-moment correlations. Such studies are invariably restricted in what they can portray, in the same way that structural theories of language development are limited in comparison with process theories and cannot be viewed as describing development, unless in its crudest form.

The dynamic approach and dynamic models in particular are valuable in supplementing static models and linear and cross-sectional empirical results. Spivey, discussing the complementarity of dynamic modeling and experimental studies, claims that

[experimentation] is like a microscope providing a particular two-dimensional perspective, or sketch, of the full three-dimensional structure of perception and cognition. These two-dimensional peeks into the actual system of interest provide useful pictures of its function, but they lack the full volumetric feeling provided by a simulation (2007, p. 82).

Variability analyses of longitudinal data provide a bridge between linear and cross-sectional analyses and abstract dynamic modeling, because they enable a glimpse into the interactions that underlie the surface structure of the data. Following

variability analyses with dynamic modeling can potentially reveal these underpinnings of the data surface structure, by confirming the interpretations of such analyses. Yet even at its highest level (which is, needless to say, considerably more sophisticated than any model included in this thesis) mathematical simulation is restricted by the limitations of human abstraction. While mathematics (and its extension in computation) is the most accurate means available for describing real life phenomena, it still imposes restrictions on an infinitely complex reality. Likewise, dynamic models may not share the reductive pitfalls of linear analyses when describing development, but they have their own set of limitations.

As the renowned physicist Landauer discovered, the noise reveals the underlying interactions that constitute the averaged signal (1998). Rather than obscuring information, the noise *is* the information; therefore its elimination is reductive. In the context of linear analyses, noise is a divergence from the central trends. However, noise reduction also takes place in dynamic studies, driven by the need to establish a clear hierarchy in their data. This call for order might be considered a disadvantage: when the data does not present a discernable hierarchy, precursor models are less likely to achieve an adequate fit (although it is still possible to depict dynamic interactions on the basis of connected grower models that are not bounded by precursor interactions). In this, the empirical dynamic approach appears somewhat conflicting with certain aspects of the theory that motivates it. To use the current studies as an example, a more complete account of development in the domains which they address would include additional variables that do not necessarily comply with the hierarchies depicted in the respective models. DST emphasizes the nested and complex nature of language and the myriad cross-interactions within it; yet from this respect, the current studies (and indeed any empirical study, dynamically-oriented or otherwise) are lacking, since they focus on easily discernible and quantifiable features of the data.

Thus there appears to be an inherent paradox in empirically applying the dynamic approach. Theoretically, the dynamic perspective attends to practically infinite complexity. Empirically, data measurements require a reduction of this complexity to simple fragments, and stochastic dynamic modeling requires a focus on markedly ordered phenomena, collapsing such measurements further into several routes that comprise a relatively simple hierarchy. The empirical dynamic approach

thus not only simplifies the developmental phenomena that it investigates, but also its own theoretical fundamentals. Addressing this apparent discrepancy, Larsen-Freeman asks “how is it possible to respect the interconnectedness of all things and still conduct practical investigations?”, and replies:

the answer, I believe, lies in finding the optimal interconnected units of analysis depending on what we are seeking to explain. Even if everything is connected to everything else, this should not lead to a paralyzing holism (2007, p. 37).

In other words, the conflict between the theoretical and empirical dynamic approach may be resolved when we consider that, precisely through reduction of data to a restricted set of parameters in a dynamic model, it is possible to show how its complexity arises. To give an example from the current study, performing correlation or factor analysis across the numerous indexes denoting each of the four writing categories (all but one of which were omitted from the model, which includes only one index per category) results in a dense web of interactions that eludes the perception of structure. Inspecting variability in the context of a limited number of components is potentially informative; attempting to document all co-developing components, even linearly, is missing the trees for the forest, to paraphrase Ellis (2007).

Nevertheless, the current studies have several drawbacks that relate to these reductive constraints. First, vocabulary knowledge and writing performance are treated as distinct areas by the bulk of the literature, with studies usually focusing on either one or the other, including those in this dissertation. However, even without regarding language as a complex dynamic system in which all aspects are interconnected, there is a strong interdependence between these areas (Laufer, 1998; Laufer & Nation, 1995). Taken together, the link between the two studies in this thesis is clear. Complexity and accuracy are embedded in the vocabulary knowledge continuum, whereas vocabulary is always used in conjunction with syntactic structures. A more sophisticated model is needed in order to capture the two dimensions in interaction. Such a model needs to rely on more cohesive theory, which does not view the constructs of vocabulary knowledge and writing performance in isolation. Yet at present, such a unified theory is unavailable. Even dual- or single-system accounts discuss the dichotomies between complexity and accuracy and between lexicon and syntax separately, despite maintaining that the same mechanisms

account for both disparities (an approach which, as noted in Chapter 5, results in internal contradictions in the dual-systems account). Thus, due to both methodological and theoretical “resource limitations”, and in order to compare its outcome with the research traditions in the vocabulary and writing performance areas, the current study did not converge these two subsystems of L2. Such an investigation remains as a future pursuit. Likewise, it is very likely that zooming in on the finer detail of these areas, for example on the subcomponents of writing development indexes, or on interactions between different measures of each category (e.g., syntactic complexity), would reveal more intricate dynamic processes and mechanisms. These have already been suggested by previous studies that revealed nonlinear interactions across syntactic complexity (Bardovi-Hardlig, 1997; 2000; Ortega, 2003) or lexical complexity indexes (Bulté et al., 2008; McClure, 1993).

The scope limitations of the current study echo a general built-in limitation of researching human and particularly language development. Components or subsystems are singled out for analysis, and regardless of how thorough and inclusive the research may strive to be, it is virtually impossible to account for all influences and cross-influences on development. As Thelen and Smith state, in reference to the innate-environmental acrimony in developmental psychology:

There is no plan. We posit that development, change, is caused by the interacting influences of heterogeneous components (...). These are not encapsulated modules; indeed, development happens, behavior is fluid and adaptively intelligent because everything else affects everything else (1994, p. 338).²⁸

Recent dynamic accounts of SLA stress the inseparability of context from learning, or of interaction from uptake (cf., Ellis & Larsen-Freeman, 2009), while an earlier application of the dynamic approach to this area has emphasized interactions within the multilingual system (Herdina & Jessner, 2002). However, as Spivey (2007) notes, it is possible to zoom in on the language acquisition process at different scales. By focusing on a particular skill (i.e., writing), at a particular level (i.e., textual) and on specific dimensions of that level, from which individual features are extracted as representative, general growth and interaction patterns can still be observed and tested. Following this line of thought, the current research has chosen to focus only on

²⁸ “Plan” and “goal” should not be confused: a learner may have a goal when learning a language, but their language development does not.

processes that occur within the boundaries of its phenomena of interest. It has therefore grouped all influences under the nonspecific classification of (limited) resources. Investigating the specific effects of various cross-linguistic influences in a dynamic framework is a further recommendation for future studies.

However, if a model based on iterating a small set of data-internal interactions has achieved a good fit to the data, as in the current studies, this does not imply that the factors which have been omitted from it are dismissible. It simply means that within the particular nested subsystem, growth over time involves constant interaction between these connected components. On other levels in the system, other interactions take place on different scales and time frames. In other words, even without accounting for, nor explicitly negating, the effect of factors beyond a given specific language subsystem, their influences remain inextricable from the internal dynamics exposed by a given study. This simultaneous, complex contribution of numerous factors and integrated co-influences to SLA is increasingly recognized by applied linguistics:

What seems to be emerging is that there are numerous factors that guide second language acquisition. They can be investigated in isolation and their significance can be determined, but they should also be investigated as interacting and converging factors to truly see how they operate in the learning of a second language (Gass, 2004, p. 88).

The current research acknowledges those numerous influences, but investigates a common denominator of ecological-dynamic principles across learners and areas of language. In the studies, given some form of unspecified environmental support and input – assumed to be relatively constant due to the academic immersion conditions – this flow of unspecified influences from beyond the system would form a part of the general resources, which determine the carrying capacity of its components. Thus, growth is bound to occur as a function of the availability of resources, but its course and shape are determined by the internal interactions, which in turn are a function of the limitations of the same resources. This does not imply that change in a given external factor would have no impact, but that the internal dynamics of the system would determine the eventual effect of such change, rather than its direct external influence. From this vantage point, the separation of the learner, with his or her unique circumstances and characteristics, such as L1, from the learning is redundant. The self-organization patterns of the system, as identified in dynamic

analyses and tested by dynamic simulations, already incorporate all of these influences, and can adequately account for development without specifying (or negating) their contribution (de Bot, 2007; de Bot et al., 2005).

Thus, although the reduction of the learning process into several hierarchical parameters may appear restrictive, it can be considered as a gateway towards understanding the general patterns that underlie unique and varied development. In a paraphrase on van Geert's (1993) island metaphor, each learner, or the interlanguage thereof, is an island, within which unique variation emerges as a result of uniform principles: natural order and the resource limitations. While such concurrence of universal principles and unique variation may seem at odds,

discrete instability and variability of performance need not be seen as a threat to the notion of systematicity in (inter)language. Thus, if we view interlanguages as complex dynamic systems, then the question of whether an interlanguage is systematic or variable no longer arises, and we can concentrate on how to find the systematic patterns in variability (Larsen-Freeman & Cameron, 2008, p. 21).

It should also be accepted that any effect in development has numerous and often inseparable causes. Therefore, competing explanations of SLA may reflect the complexity of causality in L2 development, rather than a simple dichotomy of correct vs. misguided theories. Since myriad influences operate on the process of language acquisition, there will likely always be conflicting explanations of this process. In other words, "there will never be 'a' theory of SLA. Instead, most likely there will be multiple theories and models that account for different aspects of SLA" (VanPatten et al., 2004, p. 20).

6.2.1 Implications

The outcomes of longitudinal studies which incorporate a high degree of variability cannot be generalized to other learners. However, the dynamic approach relinquishes the attempt to predict development. Rather, it aims to describe development retroactively (Larsen-Freeman & Cameron, 2008). Even in retrospect, DST can explain only a part of the variability in L2 development. Indeed, not every type of variability can be accounted for, or in fact need be. As Lowie et al. claim:

Once we appreciate the dynamics of language development in general, we can also accept that not all humans will show the same [learning] behavior even under seemingly similar circumstances (2009, p. 128).

Therefore, the pedagogical implication of the dynamic approach is that L2 development is to a large degree unpredictable, at least when it comes to linear cause and effect. While the inherent variability of longitudinal studies implies that their results cannot be extended to the learner population, what can be generalized is the fact that growth trajectories are highly individuated. If we can discern the key interacting factors, we may be able to achieve some sort of guidance of the process, although this is not guaranteed. For instance, if learners are aware that their receptive vocabulary knowledge does not transfer readily into production, they may choose to explicitly focus on production. If they are further aware of the underlying interactions between receptive and productive knowledge, they may elect to temporarily neglect the acquisition of new structures and focus on producing previously-acquired ones. However, if their receptive vocabulary knowledge is relatively small, they may need to expand it before increased production is instigated. Likewise, an awareness of the complexity-accuracy tradeoff in performance may reduce some of the expectations and disappointments involved in the process of SLA, and lead to some practical measures, such as focusing on the required dimension or strengthening its precursor.

Chapter 5 has noted that the current study is inconclusive with regard to the dispute between the dual-systems and single-system accounts of language development. This might be surprising, in light of the fact that the study shows that it is not necessary to assume dual mechanisms in order to account for disparate growth patterns in dichotomous categories of writing performance. The reason for this inconclusiveness lies in the fact that the study nevertheless assumes the categorical distinctions that give rise to the dual-systems models. If there are two (or more) distinct areas in language development, such as lexicon and syntax, which develop incongruently, it is foreseeable that they will be treated as the outcome of different mechanisms. In fact, even when a single-system model is posited (cf., Marchman & Bates, 1994), the arguments that support it rely on juxtaposing the growth of two dichotomous categories, and ignoring any overlap or fuzziness between them. For instance, it is necessary to decide which part of a lexical item has a grammatical function before observing the development of lexicon and syntax in separation, regardless of how this development is explained. Likewise, while receptive-productive modalities of vocabulary knowledge are recognized as a continuum rather than discrete categories, they are still researched as the latter by studies that aim to understand the transition between them in actual behavior (e.g., Laufer et al., 2004).

In the case of the current study, dynamic models require categorization in order to simulate different “species”, and cannot incorporate fuzzy logic.

Recent theoretical advancements in the dynamic approach strongly challenge this type of categorization, including the lexical-syntactic distinction (Elman, 2009). With regard to the lexicon, such theories dispute the distinction of knowledge levels. Instead, they suggest that word knowledge is “soft assembled” in context from activation patterns encompassing all possible state-space trajectories of representation (knowledge types, meaning, associations, pragmatic considerations, phonological and orthographical patterns and so on), rather than categorically stored in a mental depository (de Bot & Lowie, 2010; Elman, 1995, 2009). This reconsideration of categorization is referred to as *The Continuity of Mind* (Spivey, 2007), in rejoinder to Fodor’s highly-influential book *The Modularity of Mind* (1983), which has shaped the category-based research paradigm of cognitive psychology.

In this vein, Larsen-Freeman and Cameron criticize the “dualistic thinking” (2008, p. 9) of categorizations such as the Chomsky’s (1965) performance-competence distinction. They express the concern that such distinctions “obscure insights into the nature of language and its learning rather than facilitate them” (Larsen-Freeman & Cameron, 2008, p. 9). However, the problem is that just as it is impossible to empirically investigate development without some degree of reduction, as mentioned earlier, it is also very difficult to theoretically discuss such development when categories are amorphous. To illustrate this constraint, suppose a hypothetical study that investigates walking and running abilities. It is likely that a multitude of cross-influences expressed in processes of minute and continuous change determine the dynamic transition between these seemingly-distinct attractor states of human movement. Nevertheless, if a dynamic model were to depict walking skills as precursors of running skills (which the latter invariably are), the two constructs would need to be addressed as mutually-exclusive, even when the precise instant at which walking becomes running is impossible to ascertain. Thus, while recognizing the immense significance of the innovations in the theoretical dynamic approach, the present studies nonetheless assume discrete categories of linguistic knowledge and performance. However, it should be kept in mind that their findings may well embody the elusive non-categorical nature of linguistic knowledge, since some (or most) of the

variability from the growth trends remains unaccounted for by the dynamic models in these studies, as mentioned earlier.

Asides from the practical empirical constraints that lead to the assumption of categorical distinctions in these studies, it should be acknowledged that such distinctions, like words in the human mind, arise from the saliency of certain patterns. From a theoretical-philosophical dynamic perspective, the competence-performance distinction is obsolete, yet from the language user's perspective it is a valid and recurrent experience, as studies of the receptive-productive gap attest. The fact that this gap, or any other prevailing dichotomy, can be regarded as a developmental phenomenon which arises from dynamic interaction over time, rather than as a fixed and linear product, does not diminish from its relevance to describing the reality of language acquisition. Thus, categorizations in language structure or acquisition processes are not necessarily invalid, but rather reflect some inherent quality of the process at hand, fuzzy and ambiguous as it may be.

Following this line of thought, it is quite possible that the lack of agreement in applied linguistics, not just on the causality of various phenomena, but even on their definition, reflects the fuzzy and impalpable nature of these phenomena. In this context, while reviewing the interface between the generativist and cognitive approaches to the lexical-syntactic distinction, van Hout, Hulk and Kuiken conclude that, in SLA research, "a whole series of contrasts keeps returning: symbolic learning vs. connectionist learning, L1 vs. L2 acquisition, procedural vs. declarative knowledge, structure vs. process, competence vs. performance" (2003, pp. 222-223). The empirical dynamic approach does not supply answers to those contrasts. It does, however, provide a means of transcending them by posing a different set of questions. Not about categorization and linear alignment with discrete mechanisms, but about development. In other words, "the why and the how cannot always be clearly separated" (de Bot, 2007, as cited in Lowie et al., 2009, p. 138). While some form of categorization is inevitable when we talk about language, the dynamic approach can contribute to our understanding of its origins.

This dissertation has tried to reconcile the theoretical advances in the dynamic approach to SLA with the practice of conducting research. Its precursors have been some inspiring studies (Larsen-Freeman, 2006b; Verspoor et al., 2008; Spoelman & Verspoor, 2009, in press), which have utilized variability analyses to explore SLA dynamics. In attempting to expand this empirical framework, the current project has

likely overlooked some essential aspect of L2 development. It may be impossible to account for, incorporate into a study design, or indeed even grasp all of the interacting elements involved in this developmental process. But we will keep on trying.

